

The listing of claims presented below replaces all prior versions and listing of claims in the application.

Listing of claims:

1. ~~A process for catalytic hydrocarbon recombination, in which catalytic hydrocarbon is fractionated in fractionator (1), including fractionating a gasoline fraction and a diesel fuel fraction; wherein the gasoline fraction and diesel fuel fraction are combined, and an intermediate fraction is draw from the gasoline fraction and the diesel fuel fraction; then the intermediate fraction is extracted at a solvent extractor to separate the aromatic fraction and non-aromatic fraction~~ producing fractions from a catalytic hydrocarbon, in which catalytic hydrocarbon feed is fractionated in one or more stages to produce a gasoline fraction, a diesel fraction and an intermediate fraction, the gasoline fraction boiling at $35 \sim 110^{\circ}\text{C} \pm 30^{\circ}\text{C}$, the diesel fuel fraction boiling at $210 \pm 30^{\circ}\text{C}$ - $355 \pm 30^{\circ}\text{C}$, and the intermediate fraction boiling at $120 \pm 30^{\circ}\text{C}$ - $210 \pm 30^{\circ}\text{C}$. and the intermediate fraction, optionally after recombination with part or all of the gasoline fraction, is subsequently extracted at a solvent extractor to separate an aromatic fraction and a non-aromatic fraction, said fractionation being carried out by either use of a single fractionator from which three separate products, the gasoline fraction, the intermediate fraction and the diesel fraction are taken or by use of two fractionators. the first fractionator separating the feed into either a gasoline fraction and a higher boiling fraction or into a diesel fraction and a lower boiling fraction and thereafter in a second fractionator fractionating the higher boiling fraction to produce an intermediate fraction and a diesel fraction or fractionating the lower boiling fraction to produce an intermediate fraction and a gasoline fraction.

2. A process for catalytic hydrocarbon recombination producing fractions from a catalytic hydrocarbon as claimed in claim 1, wherein the intermediate fraction is fractionated by adding obtained from one or more side cuts at the middle section of the a single fractionator 1, ~~the gasoline fractionation the diesel fuel fractionation and the intermediate fractionation are done at the fractionator 1; the distillation range of the gasoline fraction is controlled at 35~110 ±30, the distillation range of the diesel fuel fraction is controlled at 210±30~355±30, and the distillation range of the intermediate fraction is controlled at 120±30~210±30.~~
3. A process for catalytic hydrocarbon recombination producing fractions from a catalytic hydrocarbon as claimed in claim 2, wherein ~~the overhead temperature of the fractionator 1~~ has an overhead temperature of is 65 [[~]] - 95, ~~the an outlet temperature of the diesel fuel is of~~ 190 [[~]] - 280, ~~the a temperature of the side cuts is 120~260, the a bottom temperature is 340~385, the an overhead pressure of the fractionator 1 is of~~ 0.11~0.28 MPa, and a the bottom pressure of the fractionator is of 0.12~0.30Mpa.
4. A process for catalytic hydrocarbon recombination producing fractions from a catalytic hydrocarbon as claimed in claim 1, wherein the fractionation is a two- step fractionation: first step, fractionate a gasoline fraction and a diesel fuel fraction, increase the temperature of the fractionator 1 by 10~15, control the distillation range of the gasoline fraction 1 at 35~210 ±30, and control the distillation range of the diesel fuel fraction at 210±30 ~355±30; pump the gasoline fraction [[1]] to the second fractionator [[2]] for secondary fractionation, an intermediate fraction with the distillation range of

110±30 ~210±30 is drawn from the bottom of the second fractionator [[2]], and a gasoline fraction with the distillation range of 35~110 ±30 is drawn from the overhead thereof.

5. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 1, wherein the fractionation is a two-step fractionation: first step, fractionate a gasoline fraction and a diesel fuel fraction, reduce the temperature of the first fractionator [[1]] down 10~40 , control the distillation range of the gasoline fraction 1 at 35~110 ±30 , and control the distillation range of the diesel fuel fraction 1 at 110±30 ~355±30 ; pump the diesel fuel fraction [[1]] to a second fractionator [[5]] for secondary fractionation, a diesel fuel fraction with the distillation range of 210±30 ~355±30 is drawn from the bottom of the second fractionator [[5]], and an intermediate fraction with the distillation range of 110±30 ~210±30 is drawn from the overhead thereof.

6. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 1, wherein the aromatic hydrocarbon fraction obtained by solvent extration is ~~are fractionated at fractionator 3, to produce at least an overhead cut and bottoms~~ and a high octane number gasoline fraction is separated from the overhead cut of ~~the~~ said fractionation 3, and a heavy aromatic hydrocarbon fraction is separated from the ~~bottom~~ bottoms thereof; and the ~~blend~~ the high octane number gasoline fraction blended with the gasoline fraction, and ~~blend~~ the heavy aromatic hydrocarbon fraction blended with the diesel fuel fraction.

7. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a

catalytic hydrocarbon as claimed in claim 2, wherein 1 to 4 side cuts are ~~added at~~ obtained from the middle section of the fractionator 1 to divide the intermediate fraction into 1~4 distillation ranges.

8 A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 1, wherein the aromatic hydrocarbon fraction is used as high quality gasoline directly.

9. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 1, wherein the non-aromatic hydrocarbon fraction is fractionated at s further fractionator [[4]], a diesel fuel fraction is separated from the bottom of the further fractionator [[4]], and ~~blend it~~ blended with the diesel fuel fraction from the first fractionator or the second fractionator fractionation to increase the cetane number of the diesel fuel, or make one or more grades of low condensing point diesel fuel; light non-aromatic hydrocarbons are separated from the overhead of the further fractionator [[4]], ~~the light non-aromatic hydrocarbons are used as chemical light oil, they can also be blended with the gasoline fraction.~~

10. (Canceled)

11. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim ~~10-1~~, wherein one or more side cuts are ~~added at~~ obtained from the middle section of the first fractionator [[1]] to ~~get~~ provide an intermediate fraction; separation of the gasoline fraction, the diesel fuel fraction and the intermediate fraction ~~are~~ being completed at the first fractionator [[1]]; the distillation range of the gasoline fraction is controlled at 35~150, the distillation range of the diesel

fuel fraction is controlled at 170~395 ,the distillation range of the intermediate fraction is controlled at 70~250 .

12. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 10-1, wherein 2 to 4 side cuts are ~~added at~~ obtained from the middle section of the fractionator 1, so as to divide the intermediate fraction into 2 to 4 streams.

13. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 12, wherein ~~the overhead temperature of the fractionator [[1]] is~~ has an overhead temperature of 65~130 , ~~the outlet temperature of the a diesel fuel outlet temperature of~~ is 170~250 , ~~the a side cut temperature is of~~ 120~240 , ~~the bottom a bottoms~~ temperature of the fractionator [[1]] is of 330~385 , ~~the overhead pressure of and the fractionator [[1]] is~~ has an overhead pressure of 0.15~0.28MPa, the a bottom pressure of ~~the fractionator 1~~ is 0.12~0.30MPa.

14. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 10-1, wherein the fractionation is a two-step fractionation wherein : in the first step said catalytic hydrocarbon is fractionated in said first fractionator to produce ~~fractionate~~ a gasoline fraction and a diesel fuel fraction, ~~increase the temperature of the overhead of fractionator [[1]] and the temperature of the diesel fuel outlets by 10~50;~~ the distillation range of the gasoline fraction is controlled at 35~250 , the distillation range of the diesel fuel fraction is controlled at 170~395 ; ~~pump~~ the gasoline fraction is pumped to the second fractionator [[2]] for secondary fractionation, wherein an intermediate fraction with the distillation range of 70~250 ~~is draw~~ drawn from

the bottom of the second fractionator [[2]], a gasoline fraction with the distillation range of 35~150 is ~~draw~~ drawn from the overhead thereof; ~~pump~~ the intermediate fraction and the gasoline fraction with the distillation range of 35~150 are pumped to a solvent extraction unit to separate aromatic hydrocarbon fraction and non-aromatic hydrocarbon fraction.

15. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 10-1, wherein the fractionation is a two-step fractionation wherein: in the first step said catalytic hydrocarbon is fractionated in said first fractionator to produce ~~fractionate~~ a gasoline fraction and a diesel fuel fraction, ~~reduce the temperature of the overhead of fractionator 1 and diesel fuel outlet by 10~50;~~ the distillation range of the gasoline fraction is controlled at 35~150, the distillation range of the diesel fuel fraction is controlled at 70~395; ~~pump~~ the diesel fuel fraction is pumped to a second ~~to~~ fractionator [[5]] for secondary fractionation, a diesel fuel fraction with the distillation range of 170~395 is drawn from the side cuts ~~at the bottom of the second~~ fractionator [[5]], an intermediate fraction with the distillation range of 70~250 is drawn from ~~the~~ overhead thereof; ~~pump~~ and the intermediate fraction and the diesel fuel fraction with the distillation range of 170~395 are pumped to a solvent extraction unit to separate aromatic hydrocarbon fraction and non-aromatic hydrocarbon fraction.

16. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 10-1 wherein the aromatic hydrocarbon fraction obtained by solvent extraction is ~~are~~ fractionated ~~at fractionator 3, and~~ a high octane number gasoline fraction is separated from ~~the~~ overhead of the said fractionation 3, a heavy aromatic hydrocarbon fraction is separated from ~~the bottom~~ bottoms thereof; and the

non-aromatic fraction obtained by solvent extraction is also are fractionated at fractionator 4, ~~from the~~ to produce light gasoline as overhead the fractionator 4 are light gasoline, from the side cuts are light non-aromatic hydrocarbons as side cuts; and from bottom are a diesel fuel fraction as bottoms.

17. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 10-1, wherein the aromatic hydrocarbon fraction are is used as high quality gasoline directly without further processing.

18. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 16, wherein the high octane number gasoline fraction are is blended with the light gasoline fraction.

19. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 16, wherein the heavy aromatic hydrocarbon fraction are is blended with the diesel fuel fraction.

20. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 16, wherein the diesel fuel fraction are is blended with the diesel fuel fraction.

21. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 16, wherein the light non-aromatic hydrocarbon fraction are is blended with the gasoline fraction.

22. A process for ~~catalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 16, wherein the heavy aromatic hydrocarbon

fraction ~~are~~ is used as an independent ~~products~~ product; the diesel fuel fraction ~~serve~~ serves as ~~the~~ feed for ethylene production after being hydrogenated; and the light non-aromatic hydrocarbon fraction ~~are~~ is used as chemical light oils.

23. A process for ~~catalytic hydrocarbon recombination producing fractions from a catalytic hydrocarbon~~ as claimed in claim 16, wherein the high octane number gasoline fraction ~~are~~ is blended with the light gasoline fraction and the light non-aromatic hydrocarbons.

24. A process for ~~catalytic hydrocarbon recombination producing fractions from a catalytic hydrocarbon~~ as claimed in claim 1, wherein ~~the~~ water-soluble solvent used for extraction is recycled, ~~the~~ regeneration ~~method~~ of the water-soluble solvent being effected by is: 1) mixing ~~mix~~ the water-soluble solvent with water, the weight ratio of water and the water-soluble solvent is being 0.1-10; 2) separating the mixture ~~is separated by~~ sedimentation~~[[,]]~~ wherein three phases are formed, the top layer is being oil, the middle layer ~~is the~~ being a mixture of water-soluble solvent and water, and the lower layer is being insoluble substance; 3) distilling the middle mixed phase in step 2) ~~are distilled with the waste heat at atmosphere or vacuum condition to get the~~ at atmospheric pressure or under a vacuum to obtain regenerated water-soluble solvent and water; 4) discharge ~~discharging~~ the regenerated water-soluble solvent in 3) , cooling the separated water; 5) after cooling the water in 4) ~~is re-separated~~ reseparating to divide water and oil, ~~discharge~~ discharging the ~~recovery~~ recovered water, and ~~mixed~~ mixing with the water-soluble solvent in 1) for recycling use.

25. A process for ~~catalytic hydrocarbon recombination producing fractions from a~~

catalytic hydrocarbon as claimed in claim 24, wherein the mixed phase in step 3) is filtered before distillation.

26. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 24, wherein the weight ratio of the water and the water-soluble solvent is 0.5-3.

27. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 24, wherein the weight ratio of the water and the water-soluble solvent is 1-2.

28. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 24, wherein the water-soluble solvent ~~include~~ includes a mixed solvent of 2 or more water-soluble solvents.

29. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 24, wherein the mixed phase in step 3) is filtered for more than ~~one time~~ once before distillation.

30. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 29, wherein ~~the filtration separation~~ said mixed phase is filtered in a 2-stage filtration.

31. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 29, wherein ~~the filtration separation~~ said mixed phase is filtered in a 3-stage filtration.

32. A process for ~~eatalytic hydrocarbon recombination~~ producing fractions from a catalytic hydrocarbon as claimed in claim 30, wherein ~~the filtration separation~~ said mixed

phase is filtered in series.